Dataprep news

ProtoDUNE sim/reco

David Adams
BNL
October 9, 2019

Introduction

Some recent changes in dataprep code

- Channel clocks added to the transient data
- Option added to use channel clocks in channel-tick displays
- TPadManipulator made persistent
- New dataprep module to better use decoder tool

New on paper contributions

Channel clocks

TPC transient data class

- `AdcChannelData` holds data for one TPC channel
  - Event and trigger info
  - Channel, FEMB info
  - Contiguous raw and processed ADC samples
  - And more…

Synchronization problems

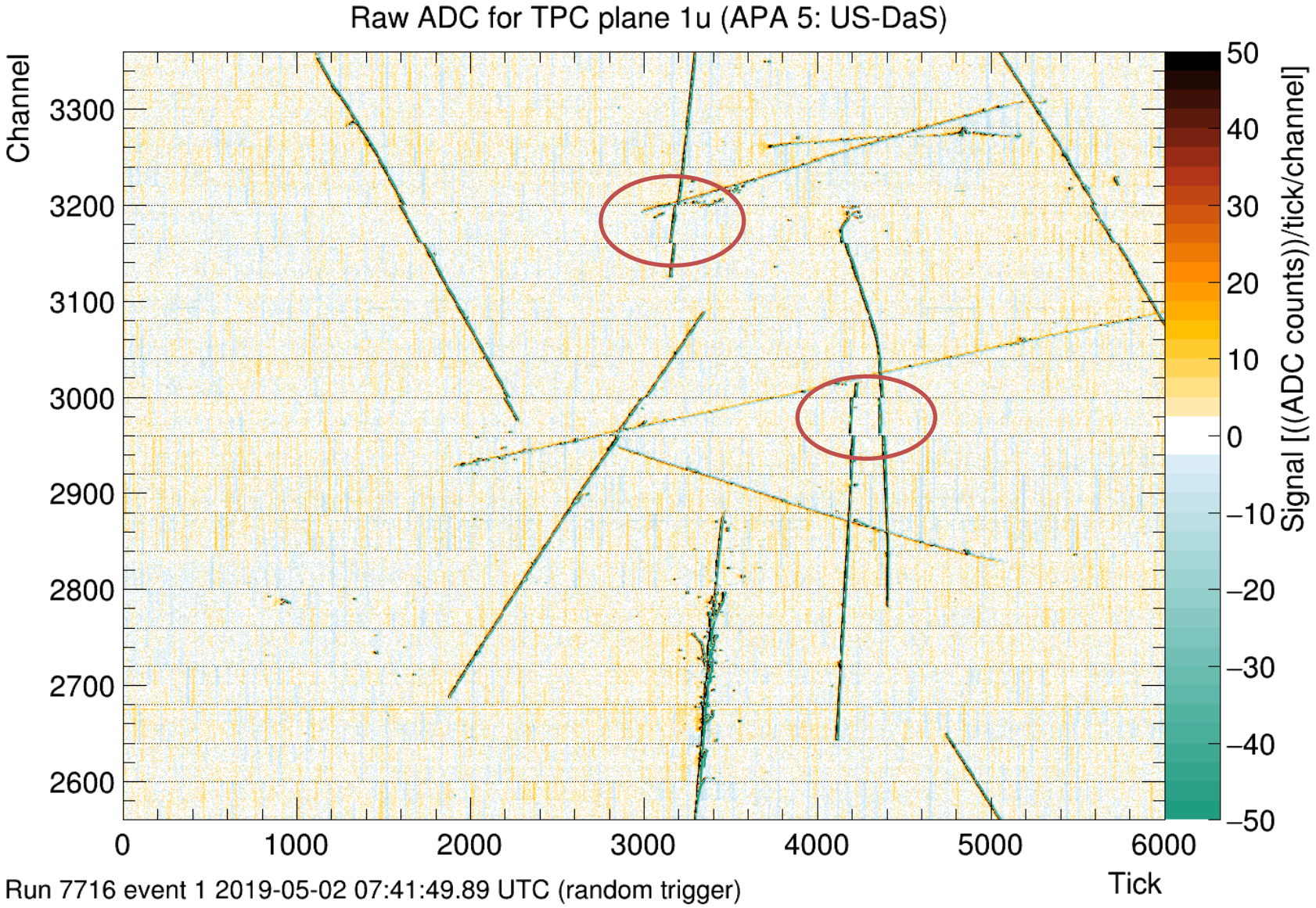
- Until recently, the transient channel data were filled for protoDUNE assuming all channels are synchronized
  - Except FEMB302 for which there is timing mitigation
  - Event displays occasionally show a FEMB out of time
  - Data taken Sep 19-23 has severe offsets
- Desynchronization presumably due to lost data
  - Clock for each channel written by decoder or dataprep should allow users to identify and skip such events (in place for long time)
- Transient data has been extended to include this clock
- And dataprep fills that data when using tool-based decoder

Channel-tick display

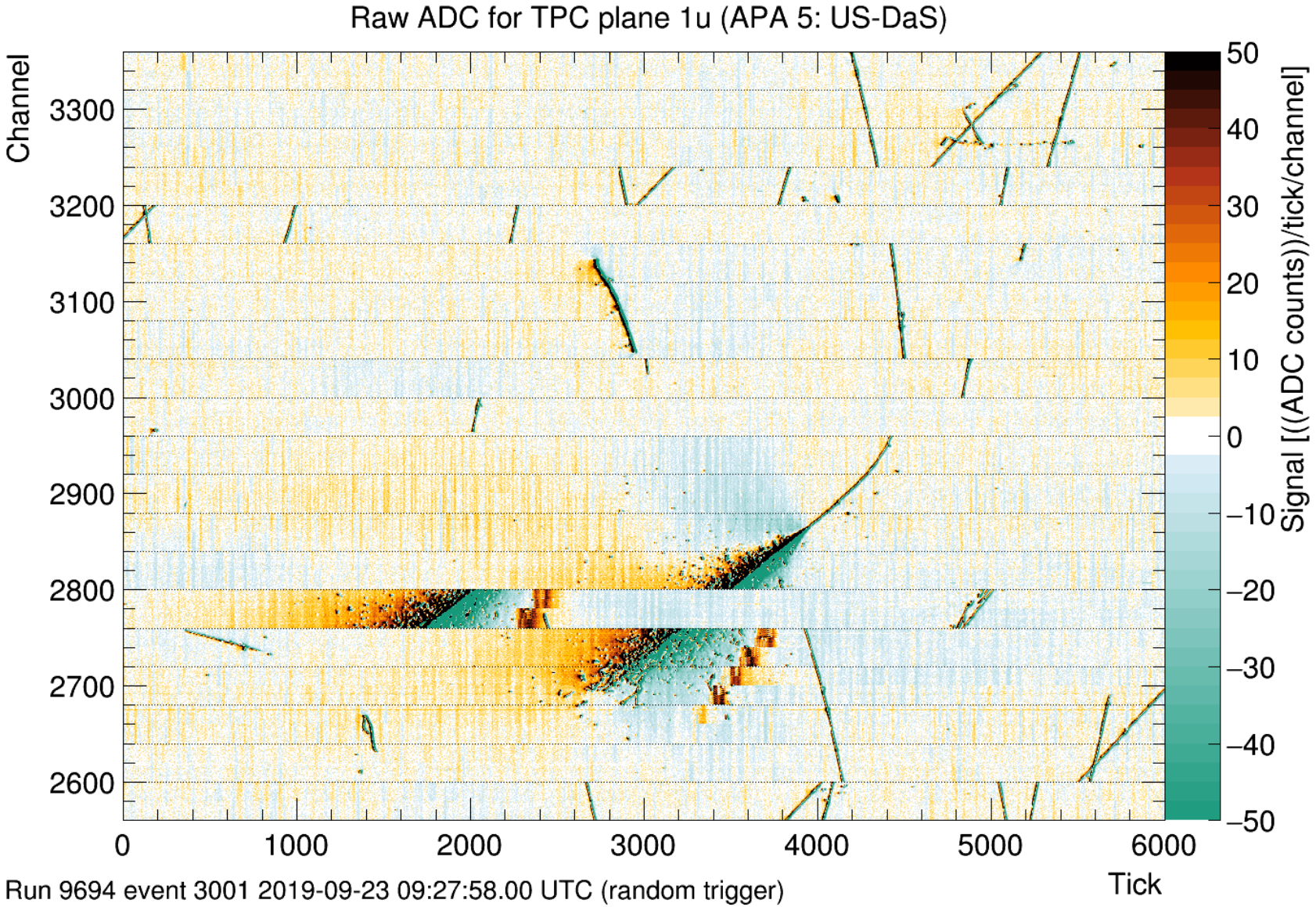
Channel-tick display tool

- Makes synchronization problems visible
- Recently modified to add option to use channel clock info
- See examples on following pages

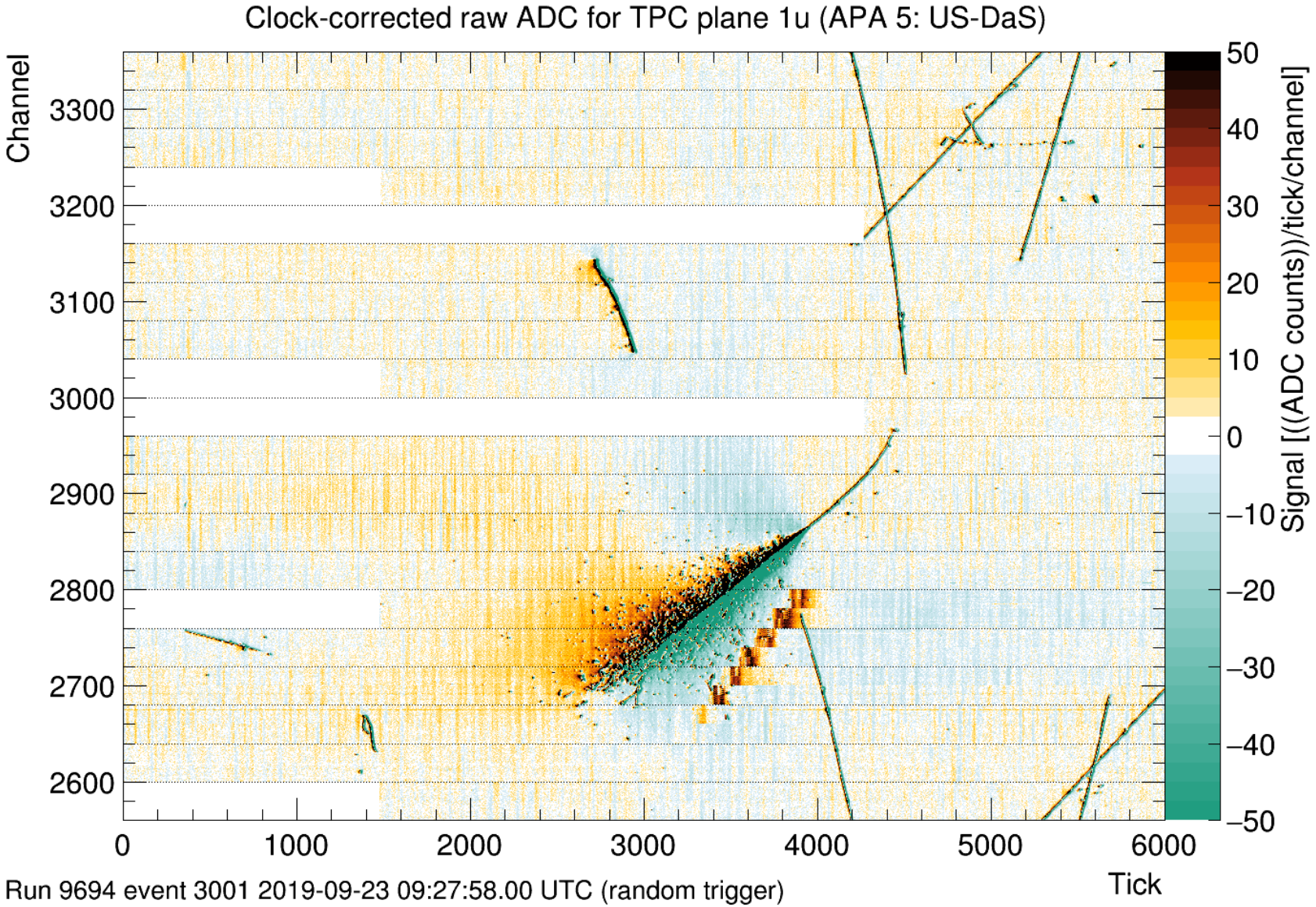
Example event with synchronization problems



Example of serious synch problem last month



Same event using channel clock info



Persistent TPadManipulator

`TPadManipulator` in dunetpc/DuneCommon

- Provides description of a drawing with histogram or graph plus overlays and decorations
- And method to draw to TCanvas and so print png, pdf, …
- Used to make most or all plots that are produced by dataprep tools
  - I.e. the plots I have been showing over the last couple years
  - And the plots I provide for the ProtoDUNE performance paper

Class recently made persistent

- Objects can saved in Root files and later used to create plots
  - In various formats
  - And with modifications, i.e. adding labels and other decorations
- Use tpad or root as the file extension: myfile.png → myfile.tpad
- Also added option to print multiple formats
  - myfile.{png,pdf,tpad} ➔ myfile.png, myfile.pdf, myfile.tpad
- Both can be used in the configuration of existing tools

New dataprep module

TPC decoder

- A month or two ago, Tom provided a TPC decoder tool that can be used in place of the decoder module
- No longer necessary to unpack the full detector data and write it into the event data store
- One importan motivation is to reduce memory usage

Existing dataprep module

- About a month ago, option was added to use this tool
- But still unpacks full detector before processing and so there is little memory saving

A new dataprep module is being developed

- Only uses the decoder tool
- Will read one APA and process fully before going to the next

News on paper contributions

Run to use in paper

- DFT spectra show noise sources come and go from run to run
- Following pages show DFTs for runs 5240 and 5726
- Earlier draft used 5726 for sample/integrated noise plots
- Prefer to use 5240 for both?
- At least for internal note, we should look at many more runs
  - Mote to come…

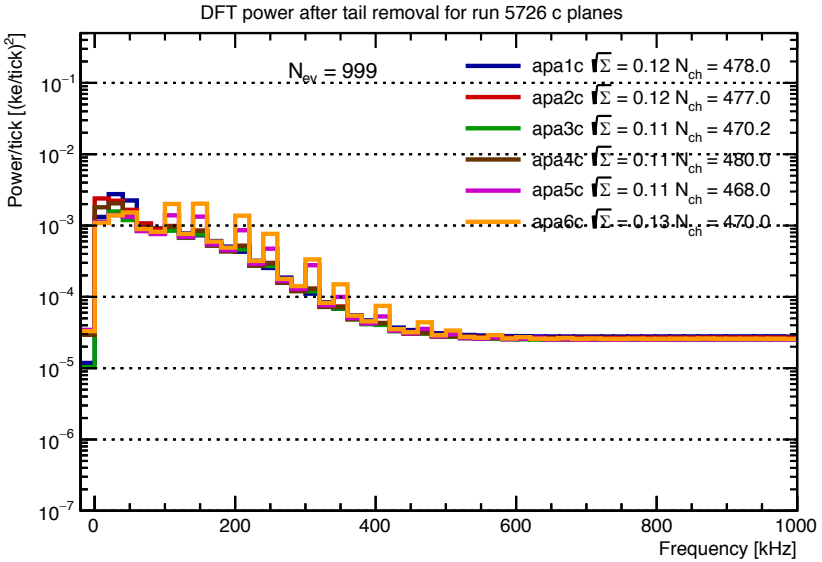
Request to show average of APAs instead of each APA

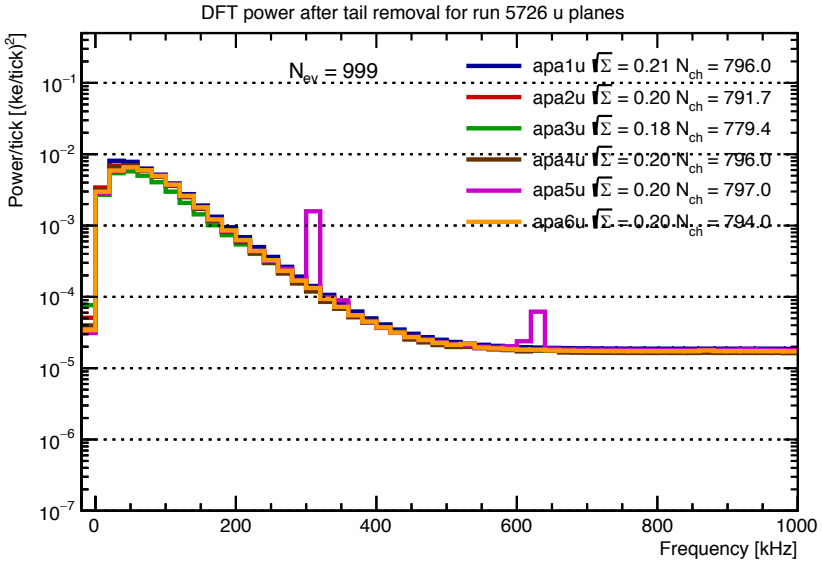
- Remaking plots with new TPadManipulator saving tpad
- Should be able to produce requested plot from that

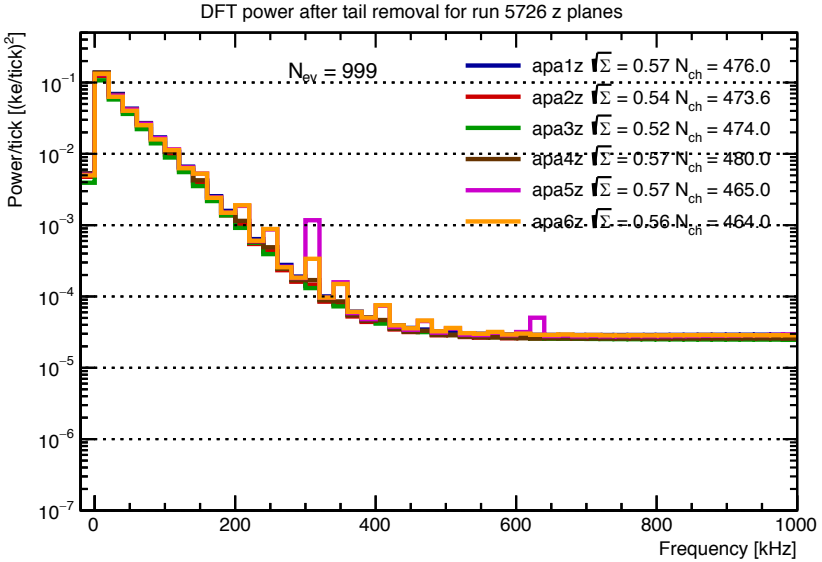
DFT of noise regions

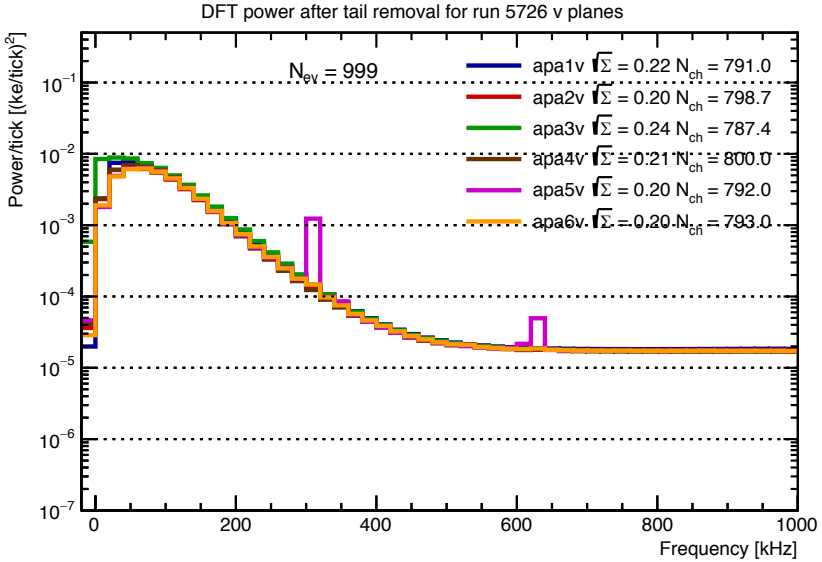
- Progress made on code to find 1000 tick quiet regions
- Plan to use these to evaluate DFT for noise
- More to come…

DFT for run 5726









DFT for run 5240